INSTALLATION, USE AND MAINTENANCE

Automatic central low-temperature boilers on pellets

<<EKO-LINE>>

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1. EC statement of compliancy

In accordance with following guidelines:

The European directive 73/23 EEZ and later amendments 93/68, 89/336 EEC and later amendments 92/31 EEC, 93/97 EEC

„KOVAN“M.I. - ul. Branilaca grada bb, 75320 Gračanica, under our sole liability, we state that the series of Ekoline boilers has been designed and constructed as required by safety standards for the CE mark. Our statement refers on our entire production of boilers types.

Dear user!

Thank you for choosing our "Eko-Line" boiler. A modern, quality and highly efficient product which ensures the largest comfort of central heating system, on a long period of time by its reliability and safety.

The maintenance is simple and it can be performed personally and easily, as well as it can be confide to Technical service of manufacturer „Kovan", whose servicemen are trained for the maintenance of boilers and if necessary they have all the needed spare parts for the boiler.

This manual contains important information and recommendations which are needed to comply with, in order to execute simple installation and to properly use the boiler for a long time.

Manager Ltd. «Kovan» M.I. Gračanica

2. Warranty

Our «Eko-line» boilers hold a SPECIFIC WARRANTY approved by the manufacturer Ltd. «Kovan» M.I. Gračanica. The manufacturer and the distributor guarantee that the product will function correctly in the warranty period at the normal use subject to compliance of this Manual and conditions of warranty.

The warranty is a part of this product, and its value is conditional by readable and filling up true data in it.

We recommend you to confide putting the boiler into operation to a professionally trained individual or contact our Technical Service «Kovan» who will on your request put the boiler into operation in manner that is specified by this manual.

Obligatorily before undertaking any activities on the boiler, carefully study this manual and read the condition from the warranty.

3. General warnings

You should study this Manual carefully to familiarize yourselves with the correct installation, handling, use and the maintenance of the boiler.

This product is delivered in one package, ensured from fracture in accordance with the regulations, and in the case that contents do not match the order, please address to department of « Kovan » that sold you the boiler or to your distributor.

It is recommended that the installation of the boiler is being performed by a professionally trained person or for these trade registered company which will after performed installations issue the owner a receipt which will confirm that the installation has been performed on current standards and by the manual of the manufacturer. All local regulations, including national and European standards must be followed while installing the device.

The boiler must be only intended for use and purpose which is specified by the manufacturer and for which it has been constructed. « Kovan » m.i. excludes any liability contractual or non contractual for the incurred damage to people, animals or objects due to errors at the installation, regulation and the maintenance and due to the inadequate use.

In the case of water leakage shut down the boiler and urgently request help of professionally trained persons. For conditions emerge from warranty inform your distributor or Technical Service « Kovan » m.i.

From time to time check whether the pressure of the installation is greater than 1 bar and less than the upper limits of the specified work pressure for the boiler of 2 bars. If you have problems with keepeng the pressure, request help of professionally trained persons or from the Technical Service « Kovan » m.i.

If the installed boiler will not be used for a longer period of time there are several options available to protect it of freezing. We recommend you to conduct some of following procedures:

a) Set the boiler's selector of functions on the “protection of freezing” mode. After that on “on “– in the mode against freezing the boiler must be powered by electric power. In this case the work of the boiler has been reduced to the minimal necessary operation to keep the system temperature on 5 ^{o}C.
b) We recommend you to fill up the heating system installation with fluency that possess a reduced point of freezing. You can mix into the heating water means for the protection of freezing FSK, Schilling Chemie (proportion 22÷55 %) or Glythermin N, BASF (proportion 20÷62 %) or Antifrogen N, Hoechst / Ticona (proportion 20÷40 %).
c) Set the boiler's selector of functions on “off” and empty the installation in the case of freezing danger.

Maintenance of the boiler must be performed at least once an year.

This manual is an integrated part of the boiler and needs to be kept carefully. It should be enclosed beside the boiler even when the boiler is given to a second owner or being transported on an other installation. If damaged or lost, request a new one from the Technical service «Kovan» m.i.

3.1. Basic safety rules

Use of products which use fuels, electricity and water, request that we comply with some safety rules:

- Children, irresponsible and inexpert persons are prohibited of operating the boiler.
- If felt smell of combustible substances in the accommodation room, air out the space by opening the door and windows, stop the work of the boiler and request help of a qualified professional person or Technical services «Kovan» m.i.
- Boiler is an electric device and in accordance with that it is prohibited to touch it barefooted or with wet body parts
- It is prohibited to interven or to clean the boiler while it is plugged into electrical supply or before it has been shut off by setting the selector of functions on "off".
- It is prohibited to adjust the boiler's safety appliances or regulators without instructions and permits from the manufacturer

- It is prohibited to drag, disconnect and touch electrical wirings even when the boiler is disconnected from electrical supply
- The boiler has not been designated for external use
- In cases when the outer temperature can fall below ZERO (danger of freezing) and the boiler is not in function apply one of the previously mentioned options
- It is prohibited to hold flammable materials in the same room with the boiler. Do not use or leave easily flammable materials nearby the (fluent fuels, dissolver, colors, etc.)

4. Instructions for safe work

4.1. Explanation of signs

Instructions for safe work are marked with a warning triangle

Words (Caution, Warning, and Danger) mark the importance of danger which could appear if measures for the damage mitigating would not be respected.

- **Caution** indicates that minor material damages can appear

- **Warning** means that minor injuries or heavy material damage can appear
- **Danger** means that severe injuries can emerge. In particularly severe cases exists danger for life

Remarks in the text are marked with a sign like this one

Remarks contain important information in cases when there is no threat of any danger for the man or the boiler.

4.2. In case of fuel gas smell appearance

- Turn off the boiler
- Open windows and doors
- Seek instructions or help from a qualified person or your serviceman

In case that the chimney has caught fire (which can be diagnosed by some of the following ways: visually - there can be seen glittering sparks or flame on the upper output side of the chimney, by hearing – muffled roar, blare or rumble inside the chimney, and by touching only if it is possible

because of a danger of burn – unusually high temperature of the chimney flue) stop the boiler's operation. All openings on the boiler (burner's door, door for ash removing, flue pipes cover) must be closed and sealed. Possible additional openings on the chimney (door for cleaning and possible spare openings) should also be closed and made sure they will not self-open because of the increased pressure of the gases in the chimney. During burning and later after self quenching and cooling the chimney should be constantly monitored and all noticed critical spots should be controlled. It is strictly forbidden to cool the chimney directly by water in order to put it out since by doing that we will certainly cause a chimney explosion and fire in the building. It is allowed, in case of need, to cool endangered objects in the vicinity of the burning chimney if you think that they can be caught by fire. Beside all these safety measures you should also inform a fireman on duty of the competent fire station by dialling number 123.

4.3. Transfer on another type of fuel

Installment of additional devices and using other type of fuel is not allowed as well as any kind of changes or alternations on the boiler itself.

4.4. Maintenance

The user is responsible for the safety and the environmental acceptability of the installation.

Use only original spare parts recommended by the manufacturer!

4.5. Combustion air/air in the premise

Do not close nor reduce the air hole and ventilation. If the premise has airtight windows, ensure the supplying of combustion air.

Combustion air / air in the premise maintain without aggressive substances (e.g. halogenic hydrocarbons which contains compounds of chlorines or fluorines). In that manner you will avoid corrosion.

5. Information about the boiler

5.1. Quality statement

Test on heating boilers, electrical test in accordance with reference standards EN 60335 i EN 60366 and other test in accordance with EN 303-5, are checked in a specialized laboratory of **IMQ Primacontrol s.r.l. – S. Vendemiano, Italy**.

All necessary mechanical tests in conjunction with the materials of which the boilers were built, testing the quality of the weld, compressive tests, were carried out in a

specialized laboratory for testing materials and structures - "Rudarski institut" d.d. – Tuzla.

TGM Wien (Vienna, Austria) carried out the tests according to ÖNORM EN 303-5. The results obtained by testing meet the conditions for obtaining subsidies for the purchase of the boiler in some EU countries.

About all this we have the correct documentation and quality reports. For boiler power up to 20 kW, 35 kW and 50 kW from our Eko-line boilers, we received the **CE** mark certification at the Institute **IMQ Primacontrol srl - Italy**. We are on the way to achieve this goal with our high power boilers, too.

Ensuring product quality guarantees our implementation of the approved quality system for production, final inspection and testing TÜV cert 15 100 7505 4 in accordance with the reference standard EN 9001:2000.

Within the approved quality system, every boiler is checked and carried out to appropriate tests. All our boilers are in accordance with the types described in the report, which found their quality and compliance with international standards and to meet the demands set for low-temperature boilers. Our production is also our under the regular supervision of the control house, which has conducted the tests.

5.2. Type overwiev

EKO-1-20	20 kW
EKO-1-35	35 kW
EKO-2-50	50 kW

EKO – Environmental boiler (satisfies the request of the mentioned European Directives)

1, 2 – Number of production version
20, 35, 50 – Heating power

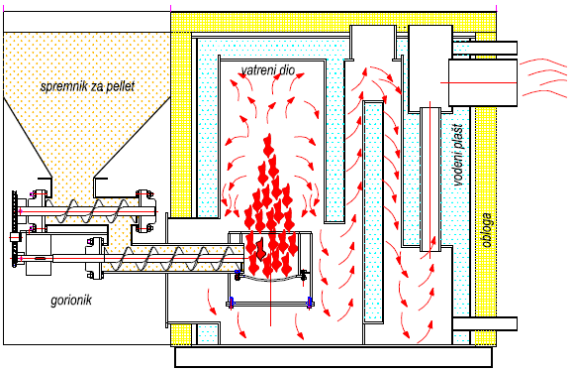
5.3. Technical data

Parameters	MU	20 kW	35 kW	50 kW
Type of boiler	-	EKO-1-20	EKO-1-35	EKO-2-50
Nominal thermal power	kW	20	35	50
Min. thermal power	kW	8	14	20
Use percentage	%	96	96	96
Boiler class	-	3	3	3
CO measured with 10% of oxygen at nominal thermal power/min. thermal power	mg/m^3	35	101	243
Outlet temperature of gasses	^0C	90	90	90
Volumetric gas flow at burning	m^3/h	35	65	80
Max. allowed operating preassure of water	kPa (bar)	100 (1)	100 (1)	100 (1)
Max. allowed operating temp.	kPa (bar)	250 (2,5)	250 (2,5)	250 (2,5)
Max. temp. in the return line of boiler	^0C	95	95	95
Min. Temperature in the boiler return line	^0C	Not conditioned	Not conditioned	Not conditioned
Loss of water preasure	mbar	No losses	No losses	No losses
Connections for water and chimney flue				
Water connection	R	1“	1“	1¼“
Chimney flue connection	mm	110	110	110
Min. conditions for chimney drawing	Pa	Not conditioned	Not conditioned	Not conditioned
Chimney diameter	mm	114	114	114
Chimney hight	mm	680	724	975
Electrical connecting values				
Connecting voltage	V/Hz	AC 230/50	AC 230/50	AC 230/50
Controlling voltage	V	DC 12	DC 12	DC 12
Installed power	W	1024	1024	1024
Max. Water pump power	W	300	300	300
Nom. work power	W	50	60	70

Parameters	MU	20 kW	35 kW	50 kW
Dimensions and weights				
Water content	l	110	145	150
Boiler length	mm	1230	1410	1150
Boiler width	mm	600	600	930
Boiler hight	mm	850	1050	1160
Weight	kg	310	395	480
Fuel				
Wood pellets	mm	ϕ6	ϕ6	ϕ6
Combustion period	h	basic 10 optional 25	basic 10 optional 25	basic 10 optional 25
Humidity content	%	up to 12	up to 12	up to 12

5.4. Boiler description

The boiler is designed to operate on wood pellets (ϕ6 diameter and length up to max. 30 mm). The construction is a steel boiler, made by welding metal sheath. Basically it consists of three brass shell (the inner fire, middle water and external protective sheath), the burner assembly and a container for pellets. Fiery mantle of the boiler plate 4 / 17 155 W4/HII/DIN, a sheet of water 4 / R St 37-2.



Hot flue gases from the burner lift up in the first chamber and partially cool by exchanging heat with water through the mantle, and then pushed by the new upcoming hot flue gases coming back up and down over the burner flame to assist combustion of fuel gas compounds, and further through the ashes burn any unconsumed remnants pass into another spatial exchange smoke chamber.

The chamber mantle is forming a water barrier and the hot flue gases are rising up in the second and refrigerated dropping down in the third space chamber. The fourth heat exchanger is a pipe which allows the maximum utilization of heat of flue gases through the chimney before being sucked through the fan into the chimney. The heat pipes were placed with the role of relays to slow the movement of smoke and heat to prolong the time of seizure.

The burner is designed as a compact module that is easily detachable with the role of precisely controlled delivery of pellets. It consists of two worm screw coupled chain transfer, and an electric motor using reduced number of. This constructive solution has a controlled delivery of pellets provided and a protection from the feedback of inflammation of pellets in the tank. The lower worm screw spins faster than the one beneath the tank, so that the delivery way is always emptied out of pellets. As a lighter it uses an electric heater that is automated flashed on and off. The heater is constructively located in the passage of air from the power turbine. The controlled delivery of burning air is done by a air turbine, with direct regulation of the revolution number of the turbine.

The boiler management is automated through an electronic module equipped with a display. The electronic module is a multifunction input control unit. It is located on the front side of the boiler. Through this module the regulation and management of the boiler is achieved. Service functions that can directly be accessed: water temperature, dosage of ignition, dosage of burning, dosing of extinguishing, air of ignition, air of burning, air of extinguishing, water pump switch.

In order to increase security and safety in the control circuit of the electronic control and regulation a probe is installed, that continuously measures the temperature of the water. In case of exceeding the limited temperature (> 100 ^{o} C), the security probe acts automatically and turns off the electrical supply to the boiler and thereby preventing re-ignition until the cause is not removed.

In order to eliminate chimney impacts on the work of the boiler, at the exit of the boiler a fan is installed as its integral part. The electronic control module controls its number of revolutions, so that it always produces a vacuum (35-40 Pa), which is needed to overcome resistance in the flues and to achieve the required vacuum of 20 Pa at the burner. When starting up the boiler the fan starts at first (to pull up all possible residual gases), and after a short period the boiler starts itself. After turning off the boiler the fan works for another 2 minutes to extract all the residual gases produced by burning. Fan operation is silent. Cleaning the fan is not necessary because there is no accumulation of impurities in the form of smut, ash and condensate.

Other parts of the boiler are: flue pipe cover, turbulators - relays in the flue pipes, bottom of the burner, the outer sheathing with thermal isolation, fire door, ash door, the door above the flue pipe, chimney, container of pellets.
In addition, more can be installed: space temperature controler, modul for ignition by phone - GSM thermoregulator.
The space temperature controler consists of a wireless thermostat and a radio receiver switch. The role of the wireless thermostat is to measure the ambient temperature and to compare it with a given temperature. When the room temperature is lower than the default, the wireless receiver will turn on the boiler.
The GSM thermoregulator is designed to control and monitor the heating system and to remote control the central heating boiler. The precision of the sensor is ± 0.5 ^{o} C, and the temperature range is -55^{o} C - +125 ^{o} C. When the temperature exceeds the upper or lower given temperature, it automatically generates and sends a messages to the assigned telephone numbers (max. 4 phones).
The boiler, depending on the orders, can be compared to the chimneys left or right.
The boiler starts up by pressing a button on the display. If you decided for the option with a room thermostat or a telephone module, then you are more comfortable to start the boiler by setting the room thermostat or via a text message by phone.

Working water pressure in the system (pressure measured at the connection when the boiler is in operation) is 1.0 to 2.0 bar. Install the safety valve (according to the scheme below) to the pipe installation at the exit of the boiler, and choose it to release 2.5 to 3.0 bar.

The degree of combustion: combustion of pellets was ≈ 99%. From standard quality pellets, by burning 1000 kg mass remains ca. 10 kg of ash and slag.

Crucial influence on the condensation is the water temperature in the boiler. Recommended min. working water temperature is 40 °C. With an electronically controlled water pump it is provided that this requirement does not turn of the pump before the water temperature reaches the minimum required 40 ° C.

The boiler connection to the water heating installation is the output of the tube dimensions R1" with external thread (50 kW boiler - R1 ¼").

The boiler is completely thermally isolated and does not heated the room where it is located. The maximum surface temperature of the boiler goes below 85 °C. Therefore, there is no need to take any special measures of protection for combustible materials and furniture. The boiler is constructed in accordance with applicable European standards and it incorporates the necessary safety and security elements accordingly.

A square cross string with no asbest was used to seal on the dedicated channels built on the back doors and lids.

The boiler has on top a mechanical ducted outlet.
Power supply meets the requirements for the safety of certain provisions of the regulations: electrical household appliances. Power is derived through a socket, or by boilers fed with an inseparable cable (directly connected), over a circuit breaker (fuse). The power cable has a protective conductor with a corresponding section 3x1, 5 mm^2. The power supply for the pump is solved by a special socket, that does not allow connection of other electrical devices.

All parts of the boiler exposed to high temperatures are protected by fireproof paint coating for metal, resistant to temperatures up to 700 ^{o} C. All other parts of the boiler are protected by anti-corrosive paint in two coats. The outer shell is protected by applying a powder paint (coating). All boilers are afraid the combination of green - yellow.

There is no emission of gases into the boilers surrounding space.

A protection from freezing is provided by our software.

5.5. Applied regulations

During designing and construction of the boilers, following directives and regulations are applied:

- Constructions of boiler harmonized in compliance with European directives 98/37/EC, 97/23/EC and European standards EN 292-1:1991, EN 292-2:1991, EN 12952-2, EN 12952-3, EN 12952-4, EN 12952-5, EN 60335-2

  - BS EN 292-1:1991 - Safety of machinery. Basic concepts, general principles for design. Basic terminology, methodology
  - BS EN 292-2:1991 - Safety of machinery. Basic concepts, general principles for design. Tech. principles and specifications
  - BS EN 12952-2:2001 - Water-tube boilers and auxiliary installations. Materials for pressure parts of boilers and accessories
  - BS EN 12952-3:2001 - Water-tube boilers and auxiliary installations. Design and calculation of pressure parts
  - BS EN 12952-4:2000 - Water-tube boilers and auxiliary installations. In-service boiler life expectancy calculations
  - BS EN 12952-5:2001 - Water-tube boilers and aux. installations. Workmanship and construction of pressure parts of the boiler
  - BS EN 60335-2-88:2002 - Specification for safety of household and similar electrical appliances. Particular requirements. Particular requirements for humidifiers intended for use with heating, ventilation, or air-conditioning systems

- Testing of boiler has been done in compliance with EN 303-5. Hydraulic tests are carried out with 100% control. Each delivered boiler has been tested according to protocol by water pressure of 4 bar and the official record about that is being kept.

5.6. Scope of delivery

- Central heating boiler
- Cleaning accessories
- Pellets container
- User manual
- Warranty card
- Plug for electric pump
- Remote alarm
- Instructions for handling and use of the customer supplied accessories

5.7. Accessories

- Lever to pull the bottom of the burner
- Scraper
- Small spade

Note: As additional accessories you can order the appropriated vacuum cleaner for the ash

5.8. Inscriptive plate

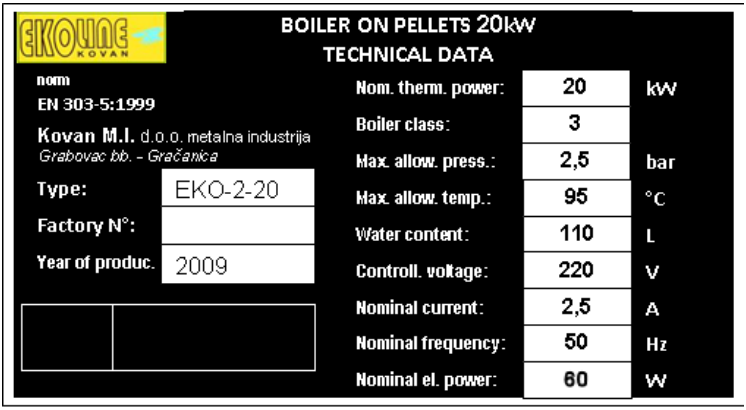
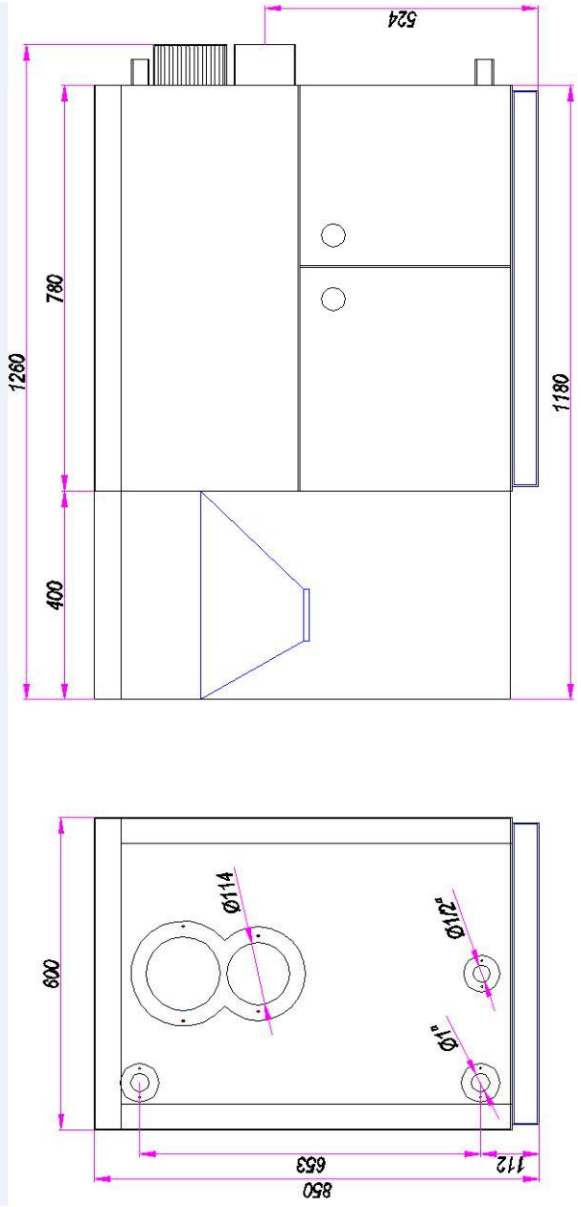
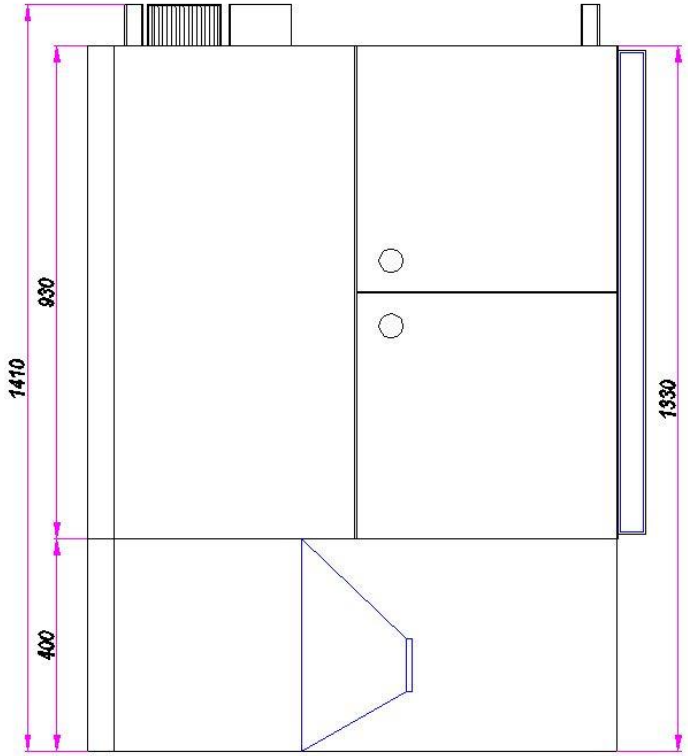


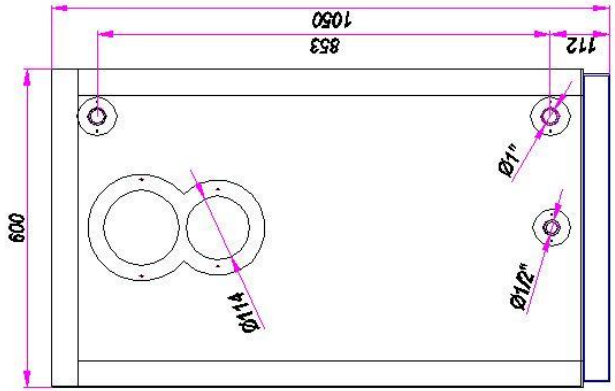
Figure – Appearance of the inscriptive plate

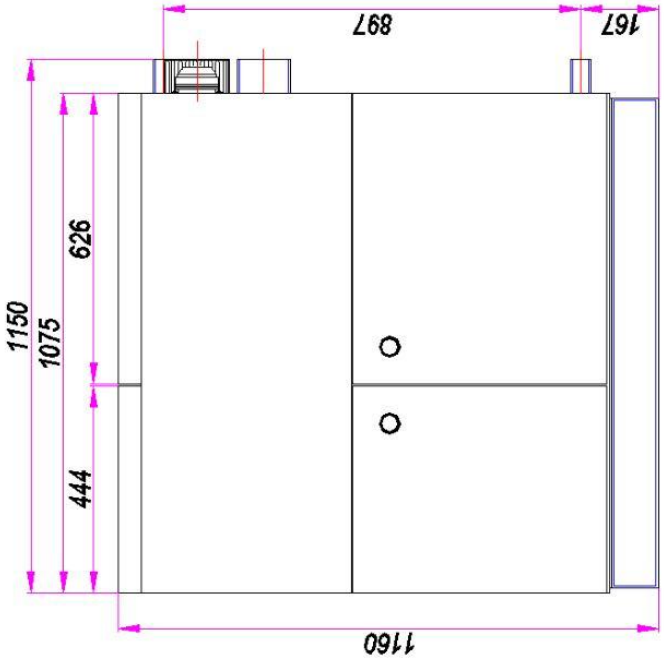
5.9. Over-all dimensions

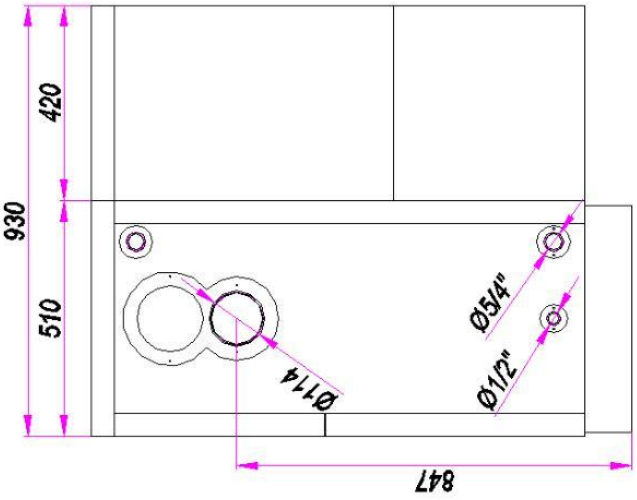
Type	Length (mm)	Width (mm)	Height (mm)
EKO-1-20	1260	600	850
EKO-1-35	1410	600	1050
EKO-2-50	1150	930	1160


524
1260
780
400
1180
600
Ø114
Ø1/2"
Ø1"
653
112
850


1410
930
400
1330


1050
853
112
600
Ø1"
Ø1/2"
Ø114


897
167
1150
1075
626
444
1160


930
420
510
Ø114
Ø54"
Ø1/2"
847

5.10. Connecting of electric elements

NAPAJANJE	1 2 3
SONDA SIGURNOSNA	4 5
VENTILATOR	6 7
TURBINA	8 9
PUMPA	10 11
DOZATOR	12 13
UPALJAČ	14 15
ALARM	16 17
SOBNI TERMOSTAT	18 19
ULAZ TELEFON	20 21
SONDA DIMA	22 23
SONDA VODE	24 25

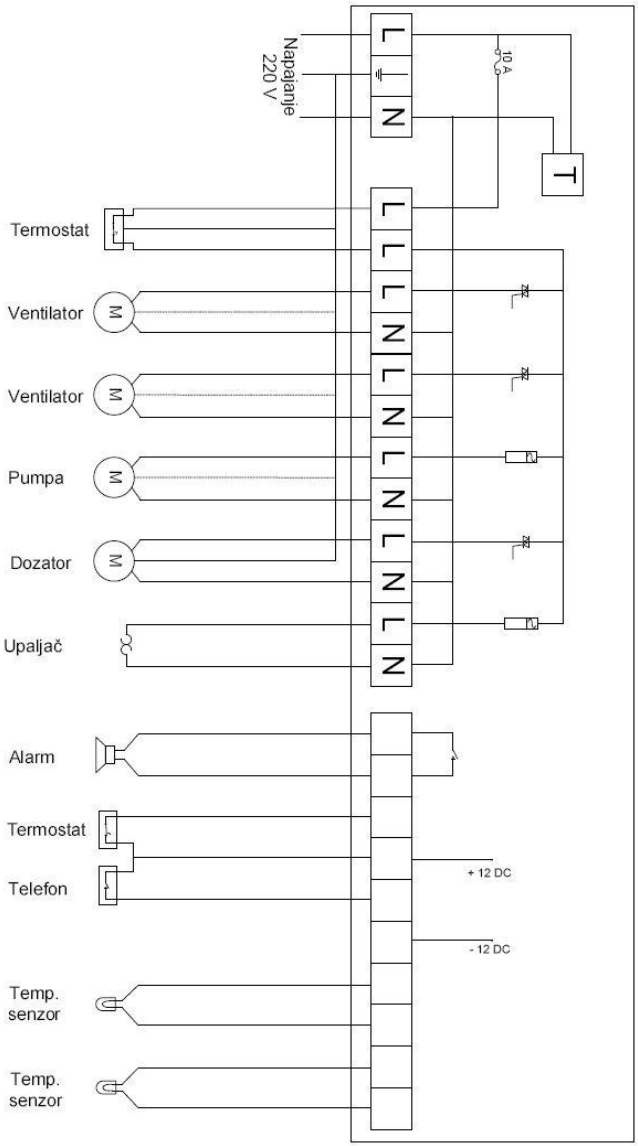


Figure – Schema of electrical elements joints

6. Boiler installation

Note: Installation, power connection, the flue conncetion and putting into operation is allowed to be performed only by professional qualified persons

6.1. Important instructions

Before selecting the type of boiler we recommend to seek expert opinion of the manufacturer.

Before the first commissioning, carefully study the technical manual. For possibly not understanding the instructions, and other uncertainties contact a qualified service person or the manufacturer.

The boiler is installed in central heating systems to DIN 4751-1 and DIN 4751-2 (obligatory safety components in the open and closed heating systems). The mandatory safety components of central heating systems include: pressure gauge with thermometer, shut-off valves, water pump, safety valve, dilatation of vessels.

The water pump must be connected through the boiler. The water pump connection is clearly marked with appropriate labels.

The maximum allowed power for water pumps connected via the dedicated connection is 330 W. If you need to connect a water pump with higher power than allowed, you need to connect the pump over an electromagnetic switch and in this case only supply the electromagnetic roll of the switch through the port indicated by the label.

Make sure that the pellets you are using have the required quality standards.
It is strictly prohibited burning and incineration of waste and any other combustible materials in the boiler burner.
It is strictly forbidden to add fuel in liquid form.
Before starting the boiler you must irradiate the ducted outlet.

6.2. Installation location

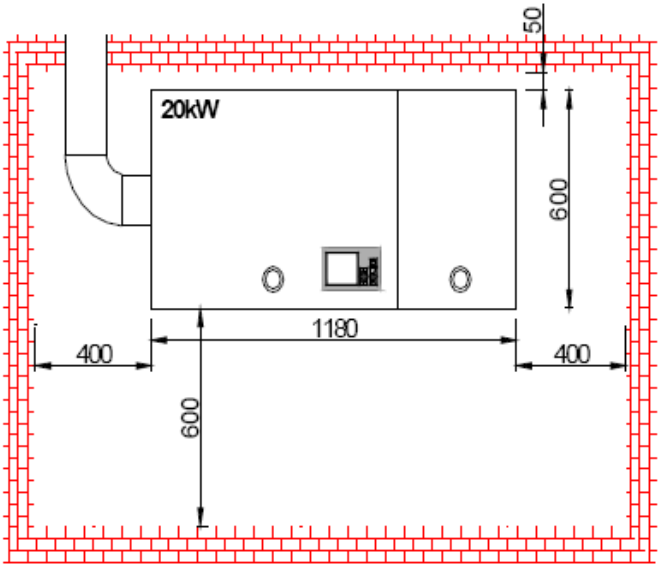
The boiler should be placed on a flat, non-combustible surface. The area in front of the boiler should be about 60 cm. For Boiler 20 kW and 35 kW the recommended minimum distances are:

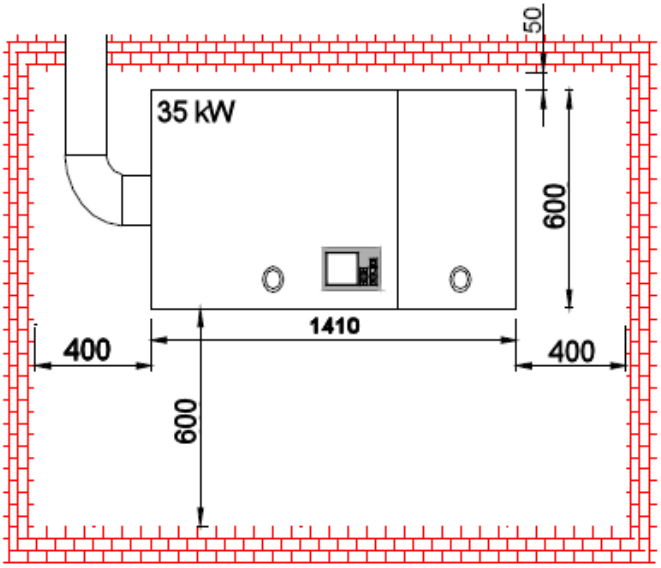
• From the back wall of the boiler 5 cm, for smooth lifting of the lid

• On the side of the tank about 25-30 cm, for any intervention on the crawl

• On the chimney side 30-40 cm, to connect to water uptake and connecting terminals

For complete information see the draft how to place the boiler in a room. These dimensions are not conditioned, but only just recommended, in order for more comfortable operation and maintenance. In terms of less space these dimensions can be less than recommended.


50
20kW
600
1180
400
400
600

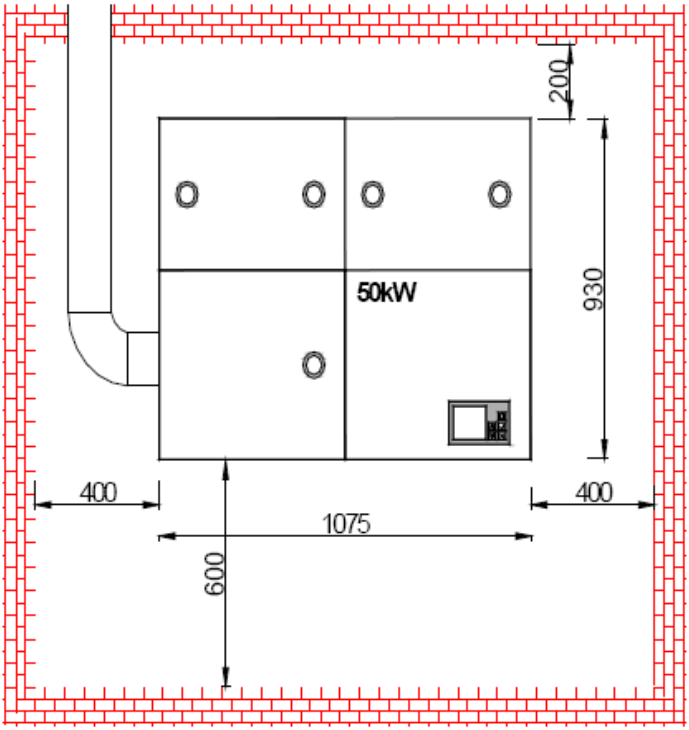

50
35 kW
600
1410
400
400
600

For boilers up to 50 kW minimum distances are:

• From the back wall of the boiler 20 cm, for smooth lift of the lid and for access the protective coverings

• On the chimney side 40 cm, for water connections

• On the other side 40 cm, for easier access in case of intervention



Be sure the on-site base load capacity is satisfied. Capacity is determined by an optional tank, and the type of boiler (approximately 2000 kg / m 2). If the existing foundation does not meet this requirement, it is necessary to take appropriate steps to better distribute the load.
In case of the collision regulations on this issue you must comply with regulations of the users country.
Refer to the instructions for installing equipment flue connector, because of their minimal-fit measures.
The setup and installation of the boiler should be done by a professional person who's competent to perform the installation for heating boilers. When installing the boiler you must comply with state regulations and codes of practice, and above all international norms.
Efficient and safe operation of the boiler will be provided if the installer during the installation is held by these regulations and guidelines given in this guide.

Chimney connection

The complex effects of the chimney on the boiler are eliminated by a fan, installed at the exit of the boiler as its integral part. Controlling the number of revelations of the fan there's always achieved the needed Vacuum of 35-40 Pa that is needed to overcome resistance in the flues in the boiler and to realize the need Vacuum in the burner of 20 Pa.

Therefore, there are no special conditions for the dimensions of the chimney or for its quality.
It is desirable that the outlet from the boiler to the chimney is made of stainless steel, and that the flue pipe is installed slightly deeper into the chimney to prevent the entry of condensate from the chimney into the boiler.
Before letting the boiler in operation, check the patency of the chimney, flue pipe, as well as any devices for protection from the wind.

6.3. Example of a boiler for heating and security systems

Systems with an open expansion tank is allowed to be used when using any types of fuel without restrictions.

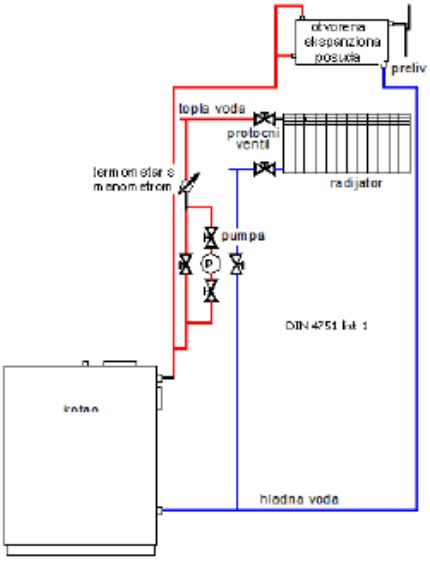


Figure – Open system

Closed-system expansion in central heating systems for solid fuels is used for boiler power up to 93 kW, in case that the required equipment for closed systems is installed (a safety valve, a thermometer and a pressure gauge, a diaphragm expansion tank with needed capacity, a security thermal protection - security probe who's activated when the temperature exceeded 95 ^{o} C, a bypass with a shut-off valve). In our case, its use is allowed to a much larger thermal power, because of a quickly interruption of the fire.

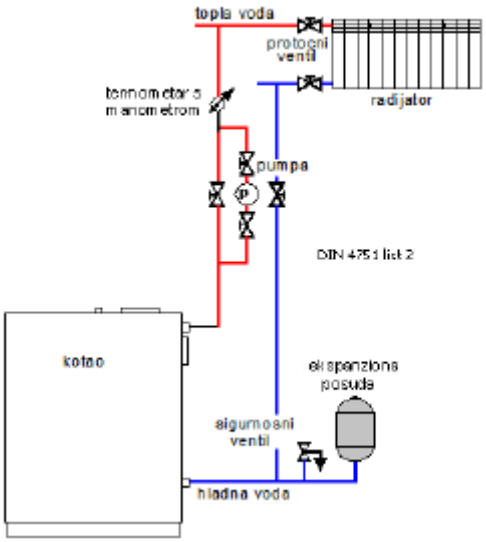


Figure – Closed system

6.4. Preparing for installation

The boiler is supplied wrapped in protective foil. Beneath the sheet, on top of the boiler, you can find the corresponding instructions and the guarantee card. The cleaning accessories are in the container for pellets and before placing the boiler they need to be removed. Also remove any protective caps on the connectors.

Place the boiler on the planned installation location.

Connect the boiler to the chimney so that there's allowed a slight drop in the boiler or a horizontal position.

Connect the hot-water installation to the boiler and a tap for filling and emptying.

6.5. Preparing for launch

Open the valves for maintaining the flow and return line of the heating system and fill up the heating installation with water. The water which is filled in the central heating system must be clean. After the first charge you should at least one time flush the entire system under pressure to remove any impurities from the pipelines that are created during the installation or earlier.

Fill the system up to pressure 1.5 bar when cold and irradiate the boiler via the built-in vent on the boiler. You should know that a part of the air (oxygen), is released from fresh water, so it is advisable to irradiate the system another time after filling. The system should be irradiated with off water pumps. It is also advisable to wait some time that air reaches the highest point. When filling up the system, make sure that the hose you use is free of air.

During the operation of the central heating system, it is necessary to maintain a constant volume and pressure of the water (the sound of water can be heard up to minor water pressure in the system). The water heating systems must not be discharged, except in unavoidable cases such as repairs and alike. When filling up the system you should take care that there is not air filled up into the system. The discharge of water from the system and refilling with fresh water enhances the corrosion and formation of lime scale. Refilling

the water system should be run only when the boiler is cold, otherwise there is danger of damage to the boiler.
After washing and filling, check the tightness of all joints in the boiler and the entire system.

6.6. Electrical connection

DANGER OF ELECTRIC STRIKE
Before work on electrical parts, the boiler must always be turned off from the electrc power supply by physical separation of the socket device from the source of electric power

All regulatory, controlling and safety appliances of boiler have been wired and tested in the factory.

On an accessible place of the boiler ensure a connecting place with a 1-phase outlet.

The place of the outlet should be properly selected so that the socket device is always easily accessible.

Note:

- Electrical connection must match the current regulations for electrical installations in households
- You must have a protective conductor
- In the case of a direct power cable connect, it is necessary to install a switching device that provides a reliable turning off of the boiler. The distance between the contacts of the device should allow the exclusion of the overvoltage category III conditions, in accordance with the norms Installation

Danger: In case of damage to the power cable it is necessary to replace it with a correct cable. Cable replacement should be delegated to a competent person or to the producers service.

Electric circuits of the boiler are secured by an electric safety fuse with a melting string of 10A. In case of fuse failure, a professional qualified person needs to check the causes and then carries out the fuse replacement with genuine fuse for the same nominal electricity. Improvisation and „ patching “of the fuse is strictly forbidden.

Electric switch on/switch off the boiler

Switching on: Switch on the boiler by plugging the electrical cable into an accessible 1-phase outlet on the wall. The illuminated display shows that the boiler is under voltage. Wait for a few seconds that the system needs to set up, and in the meantime you'll see the company's log on the display. Afterwards, by the function keys you pass through the access menu and perform any necessary adjustments.

Switching off

By pressing the button for switching off, the boiler goes in the switcing off process. That is the procedure which, depending on the boiler working mode, lasts from a few minutes to max. 10 minutes. After the switcing off process, when displaying OFF on the display, the boiler can also be physicall separated from the electrical power source.

6.7. Putting into operation

Warning: Putting into operation without water will destroy the boiler!

- Do not allow working without water
- Never start the boiler before filling up the heating system with water

Open the existing air vent on top of the boiler and make sure the system is filled up.
Set the prepressure of the expansion vessels to a static height of the heating system.
Open the radiator valves.
Slowly fill up the installation of heating at 1 bar.
Connect the circulating pump to the plug on the boiler.
Before connecting the pump check its accuracy and correctness of cord. A defective pump or its power cord will cause a failure of the electronic control module. All the defects caused by improper connection of the boiler are not a subject to the guarantee given by the manufacturer and they will not take any responsibility.

Vent the radiators.
Fill up the installation of water heating to a pressure of 1.5 bar.
Check that the type of pellet listed in this manual corresponds with the pellets in the tank. The tank can be filled to the top with pellets. Refilling the tank perform as required (by a matter of personal assessment made on the significance of influential factors on consumption: outside temperature, preferred temperature of heated space, the isolation facility ...), or when the alarm sounds, "furnace extinguish".

Ignition and warming

Check the water pressure in the heating system.

Open stop armatures between the boiler and the central heating system.

The boiler needs to be cleared from the ash and scoriae.

In-depth about the boiler handling in the Section – Selecting the service function.

If an additional temperature regulator has been installed adjust it on the wanted premise temperature (see the instruction for temperature regulator). All users which have the additional temperature regulator need to activate it through the display menu on the boiler.

Danger: Each opening of the boiler door while it is in operating mode should be done gradually and slowly, and particularly not before the minimum period of two minutes since the boiler registered burning. These measures of precaution are necessary for safety reasons because there is a danger of gathering unburned gases which could expand into the surrounding space and make an explosion if the door is suddenly opened. It is allowed to keep the door open only during the period of the boilers operation adjustment. When carrying out regulations and adjustments observe the fire from a safe distance.

Caution: Due to various types of waste and residues in the tubular network could damage the boiler.

- Rinse the pipeline to eliminate possible remains

7. Selecting the service function

The boilers are equipped with an automatic combustion. Before commissioning, it is necessary to check the settings control panel.

switch on and switch off the boiler

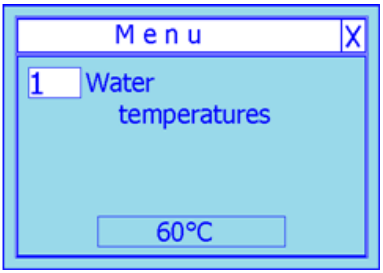
confirmation of function

returning from the menu on the initial display

entrance in the menu and walkthrough the menu

entrance in the menu and walkthrough the menu

7.1. Water temperature



The adjustment limiting is in the range of 40°C up to 95°C.

Variant 1 - Operation without a areal thermostat:

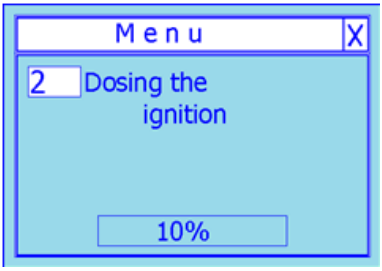
By setting the water temperature, you are regulating the temperature of the boiler, the temperature of the radiators and the heating temperature in the heated space.

- Poor isolated object, the external temperature is very cold, set the water temperature at 80 ^{o} C
- Poor isolated object, the external temperature is cold, set the water temperature at 70 ^{o} C
- Poor isolated object, the external temperature is moderate, set the water temperature at 60 ^{o} C

Variant 2 - Operation over an areal thermostat

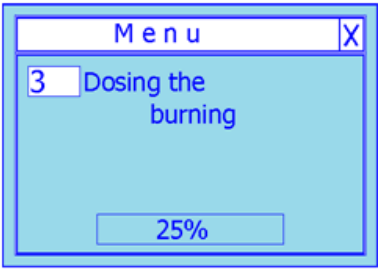
For this setting there are related many influential factors such as: the ratio of heated space and the installed capacity of the boiler, the quality of thermal insulation of the building, the external temperature at the time of setting, the quality and distribution of the heating bodies, intended heated space ... The temperature on the thermostat is adjustable in the range from +6 ^{o} C - +30 ^{o} C. The main recommendation is to set the thermostat to the half of the water temperature. In general, regardless of the external temperature, daily room temperature can be set at 22 ^{o} C, and nights at 18 ^{o} C.

7.2. Dosing the ignition



Important: The function dosaging the ignition is limited (on the display) at the max. of **15%**. A higher percentage could result in damage to the boiler.
If you have purchased pellets of recommended guaranteed quality, the recommended dosage should be set at 10%.
Minimum dosage of ignition is set at 5%.

7.3. Dosing the burning

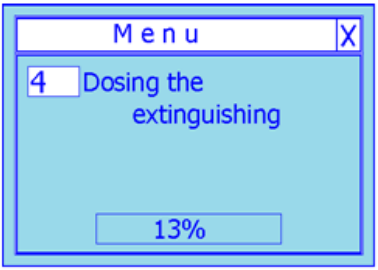


If we need the maximum thermal boiler power for wood pellets of recommended guaranteed quality with burning power of 4.8 kWh / kg, we recommend to set the function "dosing the burning" to:

- 25% for the tank to 20 kW
- 35% for the tank to 35 kW
- 45% for the tank to 50 kW

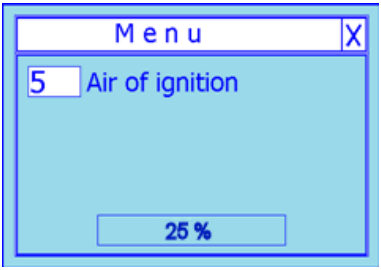
If we do not need the maximum thermal boiler power, the function of "dosing the burning" can be set to a smaller percentage.
If we have poor quality pellets, it is allowed to increase the function "dosing the burning" by 5% for each boiler. Overdose leads to improper combustion of pellets. It can also lead to "flooding" the burner, which can disable the ignitioning of pellets.

7.4. Dosing the extinguishing



Adjust the function „dosing the extinguishing“ on the approximate **half** of the selected values at previously explained function „ dosing the burning “.

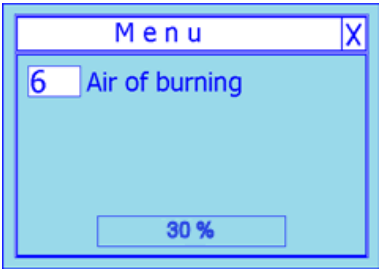
7.5. Air of ignition



This function has limited adjustment from 5% to 100%.

The major influence on the necessary amount of air ignition has the pellet. For the pellets which are produced and offered on the RBiH market, based on our present experience, we recommend to set the value for air of ignition from 25% to 40%.

7.6. Air of burning

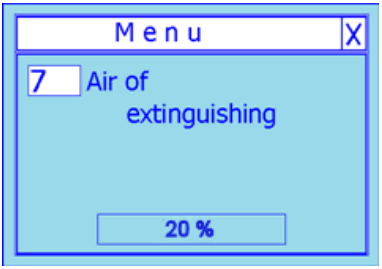


The significant influences on the adjusting of this function have the quality of pellets and their amount in the burner, the vacuum in the chimney and the flow velocity of fuel gases. For these reasons we recommend the visual adjusting of air of burning. The possible proper adjusting should be between 20 % to 70 %.

Correct burning: A bright flame without the appearance of black smoke.

Irregular burning: During the burning black smoke appears and periodically returns, which is a sign for small inflows of air of burning. If you have the appearance of non burned parts of pellets flying out of the burner, then you have an oversized inflow of air of burning.

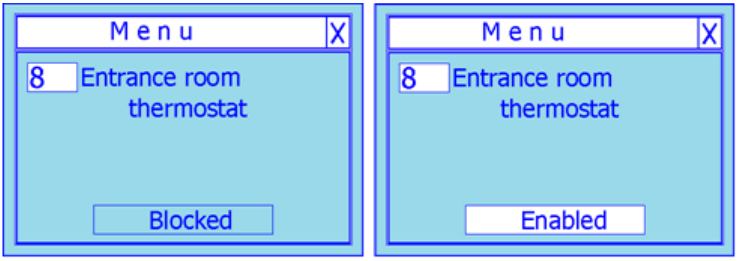
7.7. Air of extinguishing



After adjusting the air of burning, it is also required to adjust the function „ air of extinguishing “. It is important to know that the extinguishing mode of the boiler starts at the temperature 5°C lower than the set temperature in the function „water temperature“. On the display the extinguishing mode is presented by the symbol of a reduced flame. In the extinguishing mode the supply of pellets is reduced, so for this reason the necessary amount of air is also smaller.

For this adjustment do all things mentioned in the explanation of the previous function, „air of burning“. The value of „air of extinguishing“ is **always** for a nuance **more less** than the value of the function „air of burning“.

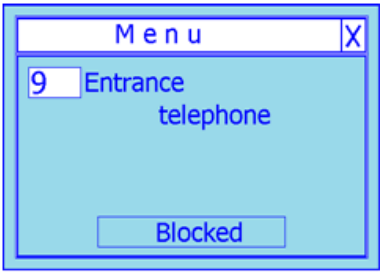
7.8. Entrance room thermostat



Important remark:
If you don't have installed an areal thermostat this function must be set to **„blocked"** so that we enable the functioning of the boiler. In this case the boiler does not wait on the information from the areal thermostat, it works based on the specified „water temperature".

If you have installed an areal thermostat, this function must be set to **„enabled"**. This adjustment gives an order to the boiler to wait on the controlling information from the areal thermostat before it starts to work.

7.9. Entrance telephone

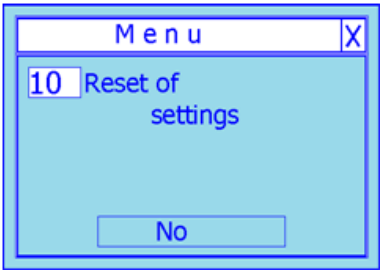


This function gives the possibility of installing a device which enables starting of the boiler by a signal which is send from a large distance using a telephone device.

Important remark:

If we don't have installed the mentioned device, this function must be set to **„blocked",** so that we enable the functioning of the boiler.

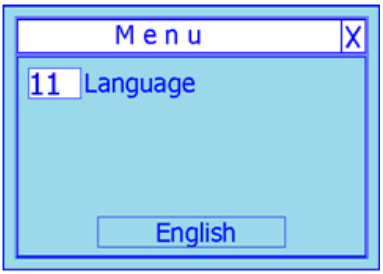
7.10. Reset of settings



This function enables to reverse all adjusted values through the „menu“ on previous (the default) factory adjustment.

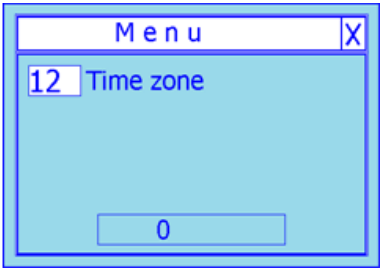
We recommend you before the first startup of the boiler, and for your later control of the boiler work or possible dilemmas, permanently note values of starting adjustment.

7.11. Language



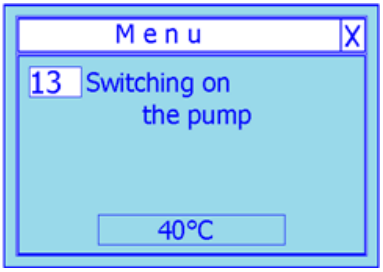
This function enables the choice of the language in the menu of the device software.

7.12. Time zone



This function is the developing capacity for later timer upgrade. Principally at the moment it makes possible choosing winter or summer computation of time. For your use of the boiler there is no special importance, so it doesn't make a difference if it's adjusted to 0 or 1.

7.13. Switching on the pump



This function enables the adjustment of the temperature when the water pump will switch on. This function has a limited adjustment from 40°C up to 95°C. Possibilities of temperature regulation are in steps per 1°C.

7.14. Software version

This data is significant for the manufacturer and your serviceman. To you this function is only necessary when you wish to inquiry the manufacturer or the serviceman regarding the handling so that you can find and acquaint them the correct software version of the electronic module of your boiler.

8. Cleaning and maintenance of the boiler

Figure – Boiler up to 20 kW (35 kW) – vital parts

Figure – Boiler up to 50 kW – vital parts

EKOLINE boilers are practical and simple for maintenance and cleaning. It is necessary every 5÷7 days to clean the burner and the space under the burner.

Explanation:

During the burning process in the burner remain fireproof substances, like sand which can be find in the pellet. Since the pellet burns down on high temperature (up to 1200°C) sand melts and unites in larger pieces of scoria. Scoria fulfills the space in the burner and obstructs the process of burning and the boiler starts to smoke, which is a sign to clean the boiler.

8.1. Cleaning method

Cleaning of flue pipes is easy and convenient. Open the top cover of the boiler shell, below the front side of the flue pipe is a lever (for boilers up to 20 kW and 35 kW) for cleaning the fire retardants located in the flue pipes. By pulling the lever up the retardants go up, by letting the lever down the ratardants go down.

It is recommended to do this procedure every time when you're filling the tank.
Thorough cleaning of flue pipe needs to be done at least once a month, or if the boiler starts to smoke. In this procedure, remove the cover (by unscrewing the nuts) of the flue pipes and you will reach the chamber containing the tubes with the retarders. Remove the retardants and clean them, brush the inside of the chamber and close the lid.
The area below the flue pipe needs to be cleaned after cleaning the flue pipes. After cleaning the flue pipes the ash falls into the space beneath the smoke chamber and accumulates there.

Caution: The vacuum cleaner is a dedicated type. The container for the ashes of this vacuum cleaner is a metal part, and may receive hot ash, which is not the case with conventional vacuum cleaner.

8.2. Cleaning order

While burning the pellets, in the burner remain incombustible parts (sand), which combines through combustion to larger pieces (slag). Cleaning the burner is needed every five to seven days, and if using pellets with more dirt it needs to be more often.
Parts of sand that can not unite into slag fall through the grid and remain in the lower burner. The bottom of the burner needs to be removed by pulling it to yourself. Remove the ashes from the lower burner, and then put back the bottom of the burner. Periods of cleaning depend on the quality of pellets. Do not let the burner to get filled by ash.

To do while cleaning the boiler

Every day:

Lifting of the upper cover of the boiler

Lever for lifting the retardants

Shaking the retardants

1 to 2 times a week:

Pulling the bottom of the burner

Cleaning the inside of the burner

Removing of ash and scoria

Removing of ash around the burner

1 time a month:

Unscrewing of the cover nuts

Removing of the flue tubes cover

Removing of chamber cover

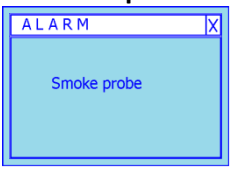
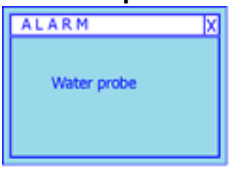
Cleaning of the chamber space

Cleaning of the burning retardants

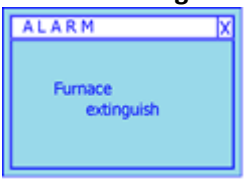
Putting back the cover and screwing the nuts

Note: It is recommended to have your boiler inspected by a qualified person before the beginning of each heating season. For safety reasons it is necessary to maintain your boiler regulary at definite time intervals.

9. List of disorders, their causes and instructions for their elimination

DISORDER	CAUSE	HANDLING
Alarm is announcing with the resonant signal which lasts until your intervention (press on to stop resonant signal and execute the reset)		
Alarm: Smoke probe 	**1**.Faulty smoke probe **2**.Break in the communication (disconnected cable)	**1**.Request assistance from authorized person **2**.Request assistance from authorized person
Alarm: Water probe 	**1**.Faulty water probe **2**. Break in the communication (disconnected cable)	**1**. Request assistance from authorized person **2**. Request assistance from authorized person

DISORDER	CAUSE	HANDLING
Alarm: **Ignition error** 	**1**.There is no pellets **2**.Burner is blocked by ash and scoria **3**.Smoked flue tubes **4**.Due to bad quality, the pellets don't fall on the worm spindle **5**.Faulty electrical lighter (indication – cold burner) **6**.Bad pellets (all previously mentioned causes excluded and there's still no ignition)	**1**.Fill up the pellets tank **2**.Clean the burner **3**.Clean the flue tubes **4**.Shake up the pellets, reset the alarm and start the boiler again **5**.Request assistance from authorized service **6**.It is necessary to adjust the function of burning and dosing **7**.In case you are not able to remove the error, request assistance from authorized service

DISORDER	CAUSE	HANDLING
Alarm: **Furnace extinguish** 	**1**.There is no pellets **2**.Burner is blocked by ash and scoria **3**.Irregulary set up of the lower cover of the burner **4**.Smoked flue tubes **5**. Due to bad quality, the pellets don't fall on the worm spindle **6**. Bad pellets (all previously mentioned causes excluded and there's still no ignition) **7**.Changed parameters of service functions or they're adjusted over the limitation	**1**.Fill up the pellets tank **2**.Clean the burner **3**.Set up correctly the lower cover of the burner **4**.Clean the flue tubes **5**. Shake up the pellets, reset the alarm and start the boiler again **6**. It is necessary to adjust the function of burning and dosing **7**.Check the settings and if necessary rerun the adjustings **8**.In case you're not able to remove the error request assistance from authorized service

DISORDER	CAUSE	HANDLING
Alarm: **Safety thermostat** 	**1**.Lack of water in the central heating system	
	a)Check the water pressure in the system, if necessary complement the system and then reset the thermostat by pressing the safety button which jumped out and can be found on the thermostat. Afterwards reset the alarm and start the ignition of the boiler again **b**)If you can't return the reset button after removed cause, request assistance from authorized service **c**)If the error after the reset is still present, request assistance from authorized service	
Alarm: **System error**	**1**.Mechanical defect of cables	**1**.Request assistance from authorized service

10.Possible issues in the work, their causes and instructions for their elimination

DESCRIPTION	CAUSE	ELIMINATION
The boiler works, but can't reach the set temperature	**1**.Dirty burner and flue tubes **2**.Bad pellets quality **3**.Wrong selection of adequate boiler power	**1**.Clean the burner and the flue tubes **2**.Check the pellets and correct the delivery of pellets through the service function „dosing the burning“ **3**.Consult the manufacturer about possible solutions
Smoke comes out of the pellets tank	**1**.Dirty flue **2**.Dirty burner and flue tubes **3**.Irregulary placed lower cover of the burner **4**.Chimney doesn't have necessary buoyancy	**1**.Clean the flue **2**.Clean the burner and the flue tubes **3**.Place the lower cover correctly **4**.Close possible redundant openings and repair possible damages

DESCRIPTION	CAUSE	ELIMINATION
Appearance of condensation	**1**.More causes related to the chimney, pellets and conditions of burning	**1**.Increase the temperature of initiation the circulation pump until the end of condensates appearance (up to max. 60 °C)
Boiler reached the set temperature but the radiators don't heat	**1**.Closed stop valves **2**.Circulation pump blocked or faulty **3**.Irregulary adjusted temperature of pump initiations	**1**.Open stop valves **2**.Check proper functioning of water pump **3**.Check (temperature of pump initation must be more less than the set heating temperature of the boiler)
Frequent griminess of the boiler	**1**.Bad pellets quality (causes the deficit of air of burning)	**1**.Increase „air of burning“ 1% - 3% in relation to the already set up adjustment
A certain quantity of non burned pellets can be found in the ash	**1**.Surplus air of burning	**1**.Adjust „air of burning“

OPIS	UZROK	OTKLANJANJE
The boiler stopped working and the display is turned off	**1**.Error in power supply **2**.Burned fuse (10 A) on the electronic module	**1**.Check the power supply **2**.Exchange the fuse **3**.In case of re-burning the fuse, contact the manufacturer
Display is turned on (illuminated) but the boiler doesn't answer on the ignition order	**1**.Entrance telephone **2**.Entrance room thermostat	**1**.If you don't have installed the mentioned device this function must be set on „blocked“ **2**.If you don't have installed the mentioned device this function must be set on „blocked“

DESCRIPTION	CAUSE	ELIMINATION
Problems due work because of the increased accumulation of scoria in the burner	**1**.Very bad pellets	**1**.Contact the supplier of manufacturer of pellets
Problems due work because of increased amount of ash	**1**.Very bad pellets	**1**. Contact the supplier of manufacturer of pellets
Enormously increased consumption of pellets (no change of outside temperature)	**1**.Very bad pellets with weak caloric power **2**.Large amount of dust in the pellets	**1**. Contact the supplier of manufacturer of pellets

11.Instructions for quality evaluation of pellets during the purchase

Biofuels, which are used to obtain thermal energy. Pellets are pressed rest of wood, up to 10% humidity. Energy value of pellets is about 18 MJ / kg (5 kWh / kg).

Volume of 650 kg of pellets takes up 1 m^3 of space.
If we compare the pellets and other energy products then we have the following relationship:
1.85 to 2 kg of pellets ≈ 1 liter of heating oil ≈ 1 m^3 of natural gas.
Ease of use puts the pellets in the same rank with fuel oil and gas. It belongs to renewable energy sources.

When buying pellets from the distributors (or manufacturers), require the declaration of testing and proving quality.

The form of pellets must be compact, uniform sizes by diameter (ϕ 6 mm). It is important to know that wet pellets can easily crush between your fingers.

The colour of pellets should be approximately equal to the colour of the wood from which it is made.

One pack of pellets may not contain more than 1% dust or sawdust in the total content of the package.

Ask the dealer for warranty from the pellet manufacturers in terms of absence of foreign impurities in the pellet. Impurities that get into the pellet during the production as a result of errors in the processing, cause a large part of the previously mentioned problems during burning (acceptable ash content ≤ 1%).

Before buying, check the weight of packaging in relation to the declared weight (on sale are bags of 15 kg).